

RESEARCH NEEDS TO SUPPORT AVIAN/BAT ASSESSMENTS AND MITIGATION AT WIND FACILITIES IN CALIFORNIA

Draft List of Research Topics

(As edited and added to during November 2, 2006 Workshop)

[Note: The values indicated at the end of each numbered research topic reflect the number of votes received during a prioritization exercise.]

Pre-construction

What are the appropriate search intervals and methodologies to gain adequate, comparable information on bird use of a site, bird behavior, and what the trade-offs are between cost, accuracy, and precision?

1. What are the appropriate frequencies, durations, and radii of point counts/visual observation scans? (10)
2. How well does observation data on bird/bat use and behavior predict potential levels of mortality? (13)
3. Can information on bird use, bird abundance, species vulnerability, topography lead to map-based indicators of collision risk? (10)
4. Can a meta-analysis of comparable data from several projects lead to an indicator of high risk situations? (10)
5. Are the heights of bird migration routes generally higher than collision risk zones? (7)
6. Is radar an effective method for determining risk? (5)
7. Can surveys conducted at dawn and dusk alone predict risk? (Songbirds? Bats?) (3)
8. What are adequate time intervals to conduct surveys (ground and radar) to account for seasonal and annual variation of use? (9)
9. Can use data alone effectively micro-site turbines in low risk locations? (0)
10. What are the appropriate metrics to determine site use? What should we be measuring? What is the best way? (3)
 - *What should we be measuring? What is the "best" way? – policy question*
 - *Often tradeoff between accuracy, precision and cost*
11. How do site utilization metrics differ by the use of different technologies (radar, night vision, thermal imaging, and acoustic detections)? (2)
12. What combination of bat and migratory songbird sensing techniques (radar, acoustic monitoring, thermal imaging, night vision devices) provides the most reliable data set on bat and migratory songbird occurrence? (12)
13. What information on bat and migratory songbird migration and habitat use would be useful for predicting mortality? (14)
14. What activity levels of bats and migratory songbird in an area would be considered high risk? (6)

Post-construction

What are the appropriate methods and metrics to accurately estimate levels of mortality due to wind turbine operations and how well did the pre-construction assessment predict impacts?

15. What is the appropriate duration of monitoring to adequately account for annual variation in fatalities due annual variation in use? Can long-term periodic monitoring (e.g. every 3 years) capture that variation as well as yearly monitoring? (16)
 - *Usefulness of Wildlife and Response Reporting System*
16. What are the adequate search intervals and search radii for the various turbine heights to capture a high percentage of fatalities? (11)
 - *Search radii has been very useful across the State*
 - *The search intervals will vary by site - split into #16 and #38*
17. What is the percentage of actual fatalities found necessary to provide confidence in estimating mortality? (8)
18. What is the level of baseline, non-turbine related mortality? (6)
19. Is the number of dead bats and songbirds found an accurate indication of bats and songbirds killed? (4)
 - *Searcher bias, scavenger and "poof"*
20. How does the taxa, size and condition (i.e. frozen) of different species affect the outcome of scavenger removal trials? (2)
21. What is the appropriate duration and metric (some use percentage of carcass remaining after so many days and some use mean number of days until all carcasses are removed) to measure scavenger removal rates? (4)
22. Are the equations used to estimate scavenger removal appropriate? (2)
23. Can the use of dogs to find carcasses be efficient and cost effective? (2)
24. What is the most appropriate fatality metric (e.g. fatality/MW, fatality/actual MW output/bird utilization) to adequately compare sites? (7)
25. Are pre-construction surveys adequately predicting mortality? (21)
26. Do patterns of bird and bat avoidance and scavenger use change after construction of wind facilities? (13)
27. What is the level of bat mortality at all California wind facilities? (6)
28. What is the level of bird mortality at all California wind facilities? (6)

Prevention/Avoidance/Mitigation

What information is necessary to develop appropriate mitigation measures and to understand the efficacy of those measures?

29. What turbine designs are more likely to result in collision? (7)
30. Can micro-siting in low risk areas and removing turbines from high risk areas sufficiently reduce fatalities? (12)
31. Can blades be made more visible to birds or bats? (6)
32. Can periodic shut downs reduce fatalities? (7)
33. How can habitat manipulations (e.g., rodent control, other prey reduction techniques) reduce bird use near turbines and reduce fatalities to acceptable levels? What impacts would they have on other species? (7)
34. Is it feasible to design a study to determine population level effects of local fatalities (particularly for winter migrants)? (2)
35. Are there ways to deter birds and bats from turbines? (10)
36. How effective is providing habitat off-site as a measure to compensate for impacts at wind facilities? (7)

New Ideas

37. New Survey Technology: Develop and testing (3)
38. What are the adequate search radii for the various turbine heights to capture a high percentage of fatalities? (6)
39. New Technology: Prevention/ avoidance/ minimization (6)

Flipchart Notes

Overarching Comments

- Compatibility over time
- Linkage to guidelines (they may affect priorities)
- Relative amounts of knowledge?
 - Least → songbirds, bats
 - Most → raptors
- Technological ideas/options fit in (as opposed to methodologies)
- Specificity vis a vis species
 - Songbirds
 - Raptors
 - Bats
 - Other...
 - Methodology may differ

Criteria (?)

- Relative amount of knowledge
- Species
- Short-, mid-, long-term
- Statewide applicability
- Use existing data – meta analysis
- What are the real, existing problems?
- Where do we already do things well?
- Where can we do things better?
- Night
- Standard metrics
- Cost
- Feasibility
- “Bang for the buck”

Possible Categories

- Risk assessment
- Survey efforts
- Survey methods
- Impact minimization